On-Road Heavy-Duty Diesel In-Use Vehicle Emissions Control Measure


Workgroup Meeting
July 18, 2006

California Environmental Protection Agency
Air Resources Board

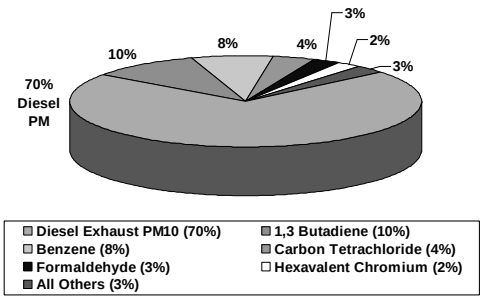
Overview

- Background
- Updated emissions inventory
- Segmentation of the industry
- Characterization of vehicle trips
- Interstate trucks and buses
- Quality of data sources
- Adopted control measures
- Emission Control Technologies
- Concepts for consideration/Issues to Address

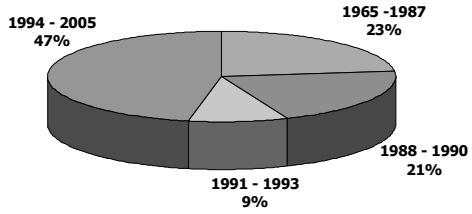
Why Control Diesel Exhaust

- Annual health impacts of diesel emissions
  - 2,900 premature deaths
  - 2,500 cases of chronic bronchitis
  - 600,000 lost work days
  - 3.2 million minor restricted activity days
- By comparison
  - 3,289 deaths from car accidents
  - 2,084 homicides

Diesel PM Contribution to Risk



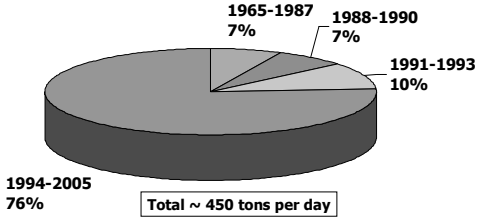
2005 PM Emissions Heavy-Duty Diesel Vehicles[1]



Total ~ 23 tons per day

1. Greater than 14,000 lbs GVWR
Source: Air Resources Board EMFAC Draft Working Model

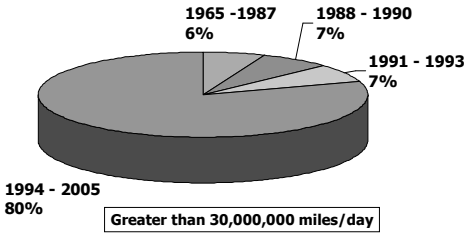
2005 NOx Emissions Heavy Duty Diesel Vehicles[1]



Total ~ 450 tons per day

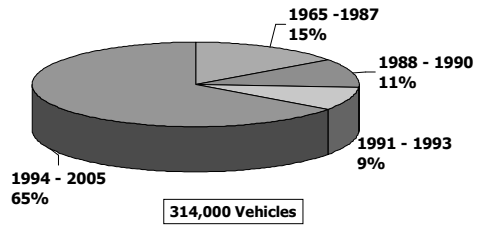
1. Greater than 14,000 lbs GVWR
Source: Air Resources Board EMFAC Draft Working Model

2005 Vehicle Miles Traveled Heavy-Duty Diesel Vehicles[1]



1. Greater than 14,000 lbs GVWR
Source: Air Resources Board EMFAC Draft Working Model

2005 Population Heavy-Duty Diesel Vehicles[1]



1. Greater than 14,000 lbs GVWR
Source: Air Resources Board EMFAC Draft Working Model

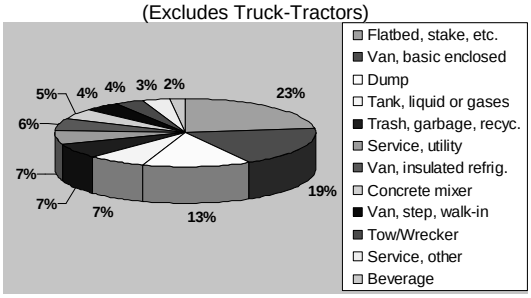
On-Road Private Fleets
Business Type

Business Type	Percent of Fleet
For Hire Transportation or Warehousing	38%
Construction	14%
Wholesale Trade	10%
Agriculture, Forestry, Fishing, or Hunting	9%
Vehicle Leasing or Rental	8%
Waste Management, Landscaping	6%
Retail Trade	6%
Manufacturing	5%
Accommodation or Food Services	2%
Other	2%

Source: California 2002 Economic Census Vehicle Inventory and Use Survey. U.S. Department of Commerce. U. S. Census Bureau

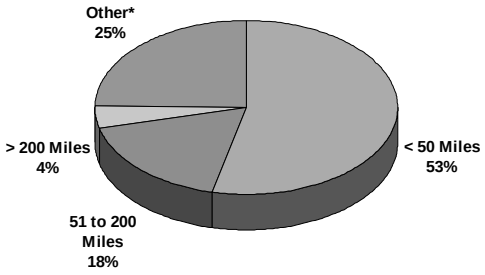
Body Types for Trucks Greater than 10,000 lbs[1]

(Excludes Truck-Tractors)



*Source: California: 2002 Economic Census Vehicle Inventory and Use Survey. U.S. Department of Commerce. 2004. Based on approximately 170,000 trucks reporting 270,000 reporting body types in survey.

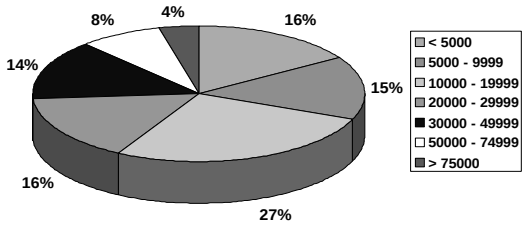
Range of Operation of Trucks Greater than 10,000 lbs



*Off-road, not reported, or not applicable
Source: California 2002 Economic Census Vehicle Inventory and Use Survey. U.S. Department of Commerce. U. S. Census Bureau

Annual Miles Traveled

(Trucks > 10,000 lbs)



Source: California 2002 Economic Census Vehicle Inventory and Use Survey. U.S. Department of Commerce. U. S. Census Bureau

Interstate and Mexican Trucking

- Subject to Heavy Duty Vehicle Roadside Inspection Program (over 133,000 total inspections since 1998)
- ARB conducts roadside inspections in cooperation with CHP.
  - Vehicle Code Section 2813 gives the California Highway Patrol authority to pull over vehicles.
- Out of state trucks would be subject to in-use vehicle particulate matter control measure
  - Health effects of emissions not different than in state vehicles
  - Should be treated equitably with in state vehicles
  - Enforcement similar to current roadside inspection program

Expected Changes to Mexican Truck Travel in California

- 1995 – USDOT Moratorium on Mexican trucks
  - Can only travel in US border commercial zone
  - Mostly 5 – 20 miles inside U.S.
- 2001 – President Bush determined NAFTA should be fully implemented (Mexican trucks should not be restricted)
  - FMCSA developed registration process to allow Mexican trucks to drive in the U.S.
  - Implementation delayed by lawsuit to determine if EIR is required
  - U.S. Supreme Court concludes that no EIR is required

ARB Emissions Model (EMFAC)

- Sources of data
  - DMV
  - CalTrans
  - Regional Council of Governments (COGs)
  - University Studies
- Currently being revised to included updated information on diesel emission factors

Adopted ARB Diesel PM Measures

- Public transit fleet rule (2000)
- School buses
  - Low emission school bus program (2000)
  - Idling restrictions (2002)
- Solid waste collection vehicles (2003)
- Stationary compression ignition engines (2004)
- Portable engines (2004)

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Future ARB Diesel PM Control Measures (2006/2007)

- Off-road mobile equipment
- On-road private fleets
- Harbor craft
- Stationary agricultural engines
- Off-road agricultural engines

Solid Waste Collection Vehicle Control Measure Status

- Required best available controls for 1988 to 2002 model year engines by early 2005
- Number of retrofits exceeded projections
  - 35% in compliance (only 10% required)
    - 22% installed Level 3 devices
    - 24% using cleanest engines available (0.01 g/bhp-hr)
- Cost-effectiveness
  - $67 per pound per year for 2004 - 2020

Public Fleets ATCM Implementation Schedule

Group	Engine MY	% of Group to use BACT	Compliance Deadline
1	1960 – 1987	20 60 100	12/31/07 12/31/09 12/31/11
2	1988 – 2002	20 60 100	12/31/06 12/31/08 12/31/10
3	2003 - 2006	50 100	12/31/09 12/31/10

Diesel PM Control Options for Existing Fleets

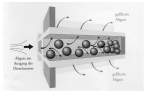
Verified PM Retrofit Technologies

- ARB verifies effectiveness of emissions control technology
- Currently 25 PM diesel emission control systems verified (5 for off-road)
  - Level 1 (25% reduction) - 9 systems
  - Level 2 (50% reduction) - 4 systems
  - Level 3 (>85% reduction) - 12 systems
- Memorandum of Agreement with U.S. EPA for emission testing and verification levels

PM Reduction From Existing Vehicles

Control Strategy	PM Reduction
Exhaust Filter	85%
Exhaust Catalysts	25%
Re-power with newer engine	20% to 90%
New vehicle	90%
Other (typical)	10% to 50%

- Engine modifications
- Fuel additives
- Alternative diesel fuel derivatives



Retrofit Technology Estimated Costs

Device	Prices Obtained	Most Common
DPF (Passive)	$5,000 - $10,000	$7,000
DPF (Active)	$15,000 - $20,000	$18,000
Crankcase Filter	$450 - $700	$450
DOC	$500 to $2,000	$900

Sources:
U.S. EPA, *An Analysis of the Cost-Effectiveness of Reducing Particulate Matter Diesel Engines Through Retrofits*, March 2006
U.S. EPA, *Reducing Emissions from the Legacy Diesel Fleet*, April 2006
MECA, *Retrofitting Emission Controls On Diesel-Powered Vehicles*, April 2006
Clean Air Act Advisory Committee, *Recommendations for Reducing Emissions from the Legacy Diesel Fleet*, April 2006

How Best to Reduce Emissions?

- Require retrofit of all 6 year old vehicles
- Require all 13-year old and older vehicles to be retired
- Restrict older trucks from large population centers
- Require older trucks to be phased out
- Require all trucks to pass an annual emissions "physical"
- Require sellers to apply retrofits upon sale
- Require retrofits by body type
- Require retrofits by business type

How to Phase in Emission Control Options?

- Require retrofits all at once
- Phase-in BACT by model year
- Phase-in BACT by engine technology
  - Mechanical controls
  - Electronic controls
- Phase-in BACT by emissions standards
  - 1991-1993; 0.25 PM & 5.0 NOx
  - 1994-1998; 0.1 PM
  - 1998-2002; 0.1 PM & 4.0 NOx
  - 2003-2006; 0.1 PM & 2.5 NOx

Other Issues to Address

- Interstate trucks and Mexican trucks
- Characterization of the fleet
- Technical feasibility (duty cycle)
- Cost/ benefits
- Competitive disadvantages
- Implementation schedule
- Flexibility
- Enforcement

On-Road Heavy Duty Diesel PM Control Measure Schedule

- First public workshop series
  - Sacramento, April 5; El Monte, April 12; and Fresno, April 13
- Workgroup meetings
  - Next meeting in Fall
- Second public workshop
  - Discuss regulatory concepts (late Summer)
- Third public workshop
  - Regulatory proposal in Winter 2006/2007
- Formal Board consideration in mid-2007